# Subject Code: 01ME2402
# Subject Name: Manufacturing Process - II
# B. Tech. Year - II (Semester - 4)

**Type of course :** Engineering Science

**Prerequisite :** Knowledge of Manufacturing process-I

**Rationale :** Understanding of basic principles of manufacturing techniques and proper selection of manufacturing processes is required in various field of engineering.

**Course Outcome :**
After learning the course, students will have/will be able to

1. Understand the basic concept of different manufacturing processes and their parameters.
2. Compare the different manufacturing processes and parameters.
3. Choose the right manufacturing process according to requirements.
4. Analyze any conventional processes and parameters.
5. Develop the sequence of operations to produce the end product.
6. Judge the limitations and scope of process to perform variety of functions.

**Teaching and Examination Scheme :**

| Teaching Scheme | | | Credits | Examination Marks | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | | Practical Marks | | Total Marks |
| THEORY | TUTORIAL | PRACTICAL | C | ESE(E) | IA | CSE | Viva (V) | Term Work (TW) | |
| 2 | -- | 4 | 4 | 50 | 30 | 20 | 25 | 25 | 150 |

**Content :**

| Sr. No. | Content | Total Hrs. |
|---|---|---|
| 1 | **PATTERN MAKING:** Identification, Design with allowances, Making a wooden pattern, Composition, methodology | 04 |
| 2 | **MOULD MAKING:** No-back mould making, Sodium silicate mould making, Specimen preparation | 04 |
| 3 | **SAND TESTING:** Permeability testing, Clay Content testing, Sieve analysis, melting metal for ready to pour | 02 |

| | | |
|---|---|---|
| **4** | **METAL PORING:**<br>Gating system design & preparation, sand mould casting | **01** |
| **5** | **INVESTMENT CASTING:**<br>Industry visit and summery report | **01** |
| **6** | **STUDY OF OTHER/REMAINING CASTING TECHNIQUES:**<br>Working principle and methodology | **02** |
| **7** | **METAL CASTING DEFECTS:**<br>List of defects with causes and remedies | **02** |
| | **MODULE 2: METAL JOINING** | |
| **1** | **INTRODUCTION:**<br>Types of joint and edge preparation | **01** |
| **2** | **SMAW (SHIELDED METAL ARC WELDING):**<br>Working Principle and set-up, Parameters, Performance | **01** |
| **3** | **MIG (METAL INERT GAS WELDING):**<br>Working Principle and set-up, Parameters, Performance | **02** |
| **4** | **TIG (TUNGSTEN INERT GAS WELDING):**<br>Working Principle and set-up, Parameters, Performance | **01** |
| **5** | **SPOT WELDING:**<br>Working Principle and set-up, Parameters, Performance | **01** |
| **6** | **OXY-ACEYTYLENE GAS WELDING/CUTTING:**<br>Working Principle and set-up, Parameters, Performance | **02** |
| **7** | **FRICTION STIR WELDING:**<br>Working Principle and set-up, Parameters, Performance | **02** |
| **8** | **STUDY OF OTHER/ REMAINING METAL JOINING:**<br>Working principle and methodology | **01** |
| **9** | **METAL JOINING DEFECTS:**<br>List of defects with causes and remedies | **01** |
| | **MODULE 3: METAL FORMING** | |
| **1** | **ROLLING:**<br>Working Principle and set-up, Parameters | **Using Virtual lab (To be Performed in lab duration)** |
| 2 | FORGING:<br>Working Principle and set-up, Parameters | |
| 3 | EXTRUSION:<br>Working Principle and set-up, Parameters | |
| 4 | DRAWING & DEEP DRAWING:<br>Working Principle and set-up, Parameters | |
| 5 | METAL FORMING DEFECTS:<br>Working Principle and set-up, Parameters | |

**Distribution of Theory Marks**

| **R** Level | **U** Level | **A** Level | **N** Level | **E`** Level | **C** Level |
|---|---|---|---|---|---|
| **20** | **30** | **25** | **15** | **10** | **--** |

**Legends: R:** Remember**; U:** Understand**; A:** Apply**; N:** Analyze**; E:** Evaluate**; C**: Create

**List of Experiments :**

1. Study and selection of a component for pattern making
2. Design For Allowance and Prepare a Pattern
3. Prepare A Mould and Casting Component
4. Analyse, Defects, Causes and Remedies of cast components
5. To understand and perform various types of welding joints by using SMAW welding Processes
6. To understand and perform various types of welding joints by using MIG welding Processes
7. To understand and perform various types of welding joints by using TIG welding Processes
8. To understand and demonstrate Oxy - Acetylene Welding Process
9. To understand and perform Metal Forming for a given Component
10. To Study Resistance Welding and Perform Spot Welding Process for Give Component
11. Virtual Lab Experiment for E – Foundry
12. Virtual Lab Experiment for Metal Forming

**Reference books :**

1. Kalpakjian, S., Schmid, S. (2019). Manufacturing Engineering and Technology. United States: Pearson Education.
2. Manufacturing technology. Volume 1, Foundry, forming and welding, 5th Edition by P N Rao, Tata McGraw-Hill
3. A textbook of production technology by P.C. Sharma, S. Chand Publishing (2022)
4. Manufacturing Processes and Systems, 9th Ed. (2008). by Phillip F., Ostwald, Jairo Munoz, India: Wiley India Pvt. Limited.
5. Castings Practice: The Ten Rules of Castings by John Campbell, Elsevier/Butterworth-Heinemann, 2004.
6. Welding Engineering and Technology, 2nd Edition by Dr. R.S. Parmar, Khanna Publisher, 2013
7. A textbook of welding technology by O. P. Khanna, Dhanpat Rai
8. Welding Process Technology by P. T. Houldcroft, Cambridge University Press

**Major Equipment :**

1. Different patterns for Demonstration

2. Small Foundry
3. Arc welding Machine (SMAW, TIG, MIG etc.)
4. Resistant Spot-welding machine.
5. Oxy- Acetylene welding machine.

**List of Open Base Software / learning website :**

1. http://nptel.iitm.ac.in,
2. http://vlab.co.in
3. http://www.sme.org/fmp/
4. http://efoundry.iitb.ac.in/Academy/index.jsp